trol; a derangement in this respect should be a most important consideration in the formulation of a legal test.

There should be some means adopted for keeping the law in harmony with advancing ethical and scientific views. This may be done through the appointment by the court of a quasi-official body of men, impartially determined, who are well qualified psychiatrists having a university education and at least five years of experience with the insane. This group should report their findings in written form to the court to be used for reference and subject to cross-examination. Thus ex parte contention and the hypothetical question, which have helped to bring medical testimony into disrepute, will be eliminated. The judge and the jury will be supplied with a clear, intelligent and unbiased report as to the mental condition of the defendant before proceeding to deliberation regarding his legal responsibility. The procedure of the court should be simplified. What is needed in the law is a proper conception of the unified personality.

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DOCTOR ORBISON (Closing).—In closing I wish to thank those who have discussed this paper and to state that since writing it I have examined three other men who have killed. One was Lieutenant Massie with whom I spent five or more hours, and was able to obtain a mass of evidence regarding his behavior just before and after his killing of the Hawaiian. I am absolutely convinced that he was in a state of delirium followed by a condition typical of ambulatory automatism that lasted for more than one hour acutely and for about twenty-four hours in a less acute state. During the first hour he had to be "slapped" and "pushed about" in order to get him to the "death car." The shooting, in fact, spoiled all the carefully laid-out "plan" that was so much discussed.

My only comment regarding the "psychiatric" testimony put forward by the prosecution demonstrated some of the most reprehensible factors that have cast so much opprobrium on the psychiatrist when he becomes a medico-legal "witness" (two of the visiting alienists never examined the defendant, but testified after reading the transcript).

In my opinion this man was legally insane because he did not know what he was doing at the time—in fact he did just the opposite to what had been planned because the death of the man killed prevented the confession he was just prepared to make.

As to the other two killers to be added to this series, one was insane (medically and legally) and the other showed no symptoms of any kind of "insanity."

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## ADHERENT SCARS—THEIR TREATMENT*

*By* W. S. KISKADDEN, M. D.
*Los Angeles*

DISCUSSION *by George Warren Pierce, M. D., and Gerald Brown O'Connor, M. D., San Francisco; Hugh Jones, M. D., Los Angeles; Will L. Miles, M. D., Los Angeles.*

IN a discussion of the treatment of adherent and cicatricial scars, it is obvious that the old subject of skin grafting in its various phases will predominate. The topic is perennial; but no doubt the activating force lies in the many serious and disabling scars and cicatrices that are constantly presenting themselves.

### TYPES OF SCARS

Most of you are familiar with the cicatricial check-rein band of thick scar, often keloidal in type, occurring after burns and infections about the neck and in the cubital, popliteal and axillary fossas. Likewise, it is easy to visualize the thin, shiny or dry scaling scars occurring on any part of the body and resulting from healing by secondary intention. When these scars occur about a joint, they tend to limit or prohibit function and may cause distortion of bone and real joint changes. Blair, Brown, and Hamm [1] emphasize this and point out that, in addition, these scars are most unstable, tending to break down frequently from minor irritations or merely lowering of the general body tone. They have demonstrated that such scars are covered by only a thin layer of epithelium, a few cells in thickness and entirely lacking in elastic tissue. Moreover they lie on a frequently thick and usually avascular scar tissue base, made up of parallel strands of fibrous tissue. This thin epithelium is rendered unstable by its lack of papillae, hair follicles, or glands to aid in attachment to the subcutaneous tissue. This lack of glandular structure accounts for the dryness, scaling, and cracking so frequently present; and because of such constant irritation it is not uncommon to find that such surfaces eventually undergo secondary malignant changes.

Fundamentally such scars are caused by tissue loss. This fact must be constantly kept in mind in planning both the treatment and repair. Such a loss may be due to either burns, infections, or surgical and traumatic debridement. Nor is it always confined only to skin, but subcutaneous tissue, fat, and muscle may also have been sacrificed.

### OBJECTS OF TREATMENT

Our treatment, therefore, must be directed, if possible, to the prevention of these scars, and the resultant immobile joints and deformities. At the same time this treatment must not lose sight of the need of a satisfactory cosmetic result.

We are not particularly concerned here with the treatment before scar formation, yet since our end-results are so dependent upon proper consideration of all forces at work, I feel that a brief discussion is indicated. The application of traction before healing has taken place is of occasional value and, if not cumbersome or annoying to the patient, should be tried during the period of preparation for surgery. Of far greater importance is vigorous treatment directed, first, to combating the infection, and secondly, to the stimulation of granulation tissue preparatory for early grafting.

We are all familiar with the use of compresses, irrigation, vaselin gauze, sugar, and other forms of treatment in the stimulation of granulations. Recently I have used 5 per cent alcoholic brilliant green on fresh and chronic granulations with very satisfactory results. A. G. Bettman [2] of Portland tells about the use of a chloretone and scarlet red ointment, which combines an antiseptic, a stimulant, and an analgesic. Doctor Bettman and his colleagues have used it with highly satisfactory results, and I have employed it with satisfaction at the Los Angeles General Hospital. Doctor Blair and his confrères advocate salt baths, alternating with dry heat, for their burn cases. I was glad to read the opinions of Blair, Brown, and Hamm, backed by the experiments of Carrel and others,

* Read before the Industrial Medicine and Surgical Section of the California Medical Association at the sixty-first annual session, Pasadena, May 2-5, 1932.

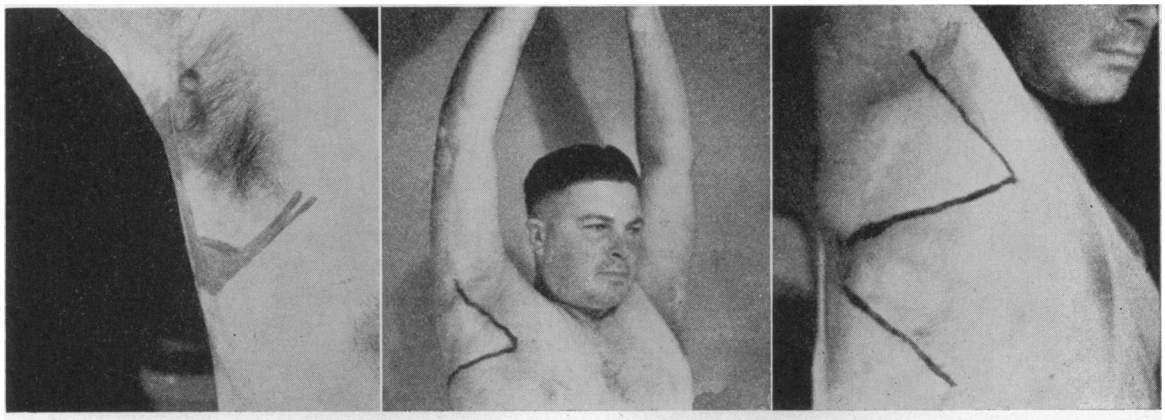

Fig. 1a Fig. 1b Fig. 1c

Fig. 1.—Showing the use of the Z and Reverse Z incision. In Fig. 1a the original Reverse Z plan may be seen. This was abandoned in order to have a minimum amount of scar in the flaps and the Z incision was used, which, with transposition of flaps, shows well in Fig. 1c. Fig. 1a shows limit of elevation of arm. In Fig. 1b is postoperative result. This case was ideal for this procedure because of the relatively small amount of scarring.

that grease dressings did not promote a healthy granulating surface and were detrimental to successful grafting. It is only too often, when confronted with a serious scar, to have the patient say that grafting had been tried but had not been successful. Further inquiry usually establishes the fact that some form of grease therapy had directly preceded the grafting.

### THIERSCH OR SPLIT SKIN GRAFTING

It is important that unnecessary delay be avoided and every effort should be expended to quickly prepare the area for grafting. The method of choice where granulations exist is Thiersch or split skin grafting. It may be done quickly and easily, even in the presence of a mild degree of infection, with an expectation of obtaining 75 to 100 per cent take. Pinch grafting is of value, but is more difficult, and healing is greatly delayed. Full thickness grafts, sieve grafts, sliding and pedicle flaps have all been employed on granulating surfaces, but I feel that their use is fraught with danger of failure, and I think that it is far safer to Thiersch graft or use split skin, and plan later to use a flap or full thickness graft as indicated.

The method of Thiersch grafting that has given the best results in my hands is by taking an impression of the area to be grafted with Stent or dental modeling compound and then applying the graft to this.[3] Dr. H. Woolsey [4] takes up this and various other types of grafting in all detail. I feel and I believe that it is the general opinion that Thiersch and split skin grafts are subject to considerable contraction. I have heard Dr. V. P. Blair say that such contraction may be as much as 60 per cent; Davis and Kitlowski prove that such is the case by a series of experiments in measuring the contractility of different types of grafting immediately following cutting them. Their conclusions were that whole thickness grafts had a shrinkage of 43 per cent; half thickness grafts, 24 per cent; and thick Ollier Thiersch grafts, 11 per cent, while true Ollier Thiersch grafts had a shrinkage range of only up to 2 per cent. These interesting experiments bear out our opinion that the elastic fibers in the corium and taken with whole thickness grafts, are necessary to prevent subsequent contraction, all subsequent contraction being dependent upon the thickness of the graft employed, and that because of the lack of contraction following cutting a true Ollier Thiersch graft the greatest shrinkage may be expected to follow its use.

By our traction, splinting, and particularly early grafting, we may have prevented some of the late contractions. However, if not, and the contraction is keloidal in type, then small fractional units of x-ray at weekly intervals may be employed with success. Some x-ray men believe that larger doses and longer time intervals are more suitable and treat keloids in this manner. I have seen both methods employed and believe the smaller dosage gives uniformly better results. This method is applicable, as noted above, only to the thick, keloidal, and flat scars. I do not believe the checkrein type, even when hypertrophied or keloidal, respond sufficiently to x-ray to warrant its use. It must always be kept in mind, however, that

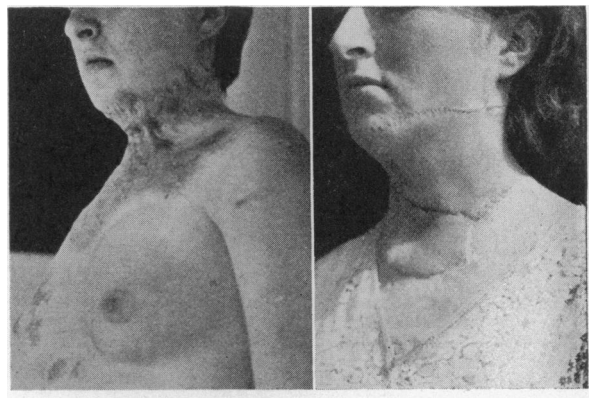

Fig. 2a Fig. 2b

Fig. 2.—Contracting scar secondary to fire burn. The scar pulled on the mouth, ear, and even distorted the eye. A split skin graft was applied and entirely corrected the deformity, but it was felt that the cosmetic result left much to be desired. A tube pedicle from the back was later used, giving the result in Fig. 2b. Function in this case is normal and fortunately the transferred skin is taking on the color of the neighboring skin. This does not always occur.

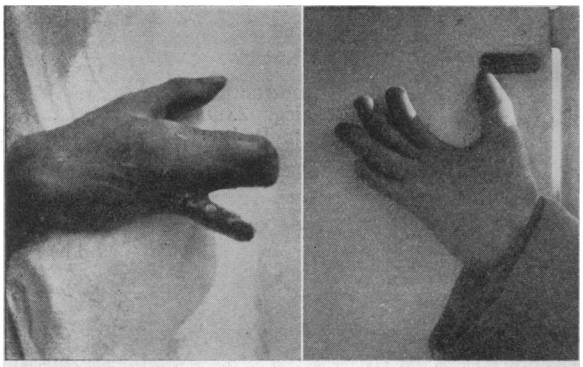

Fig. 3a Fig. 3b

Fig. 3.—Completely syndactylized fingers of one hand in negro girl of 24 years of age. The nails of the first three fingers and the distal phalanges of the first and second finger were connected. In Fig. 3a, the little finger has been separated from the others, and a full thickness graft applied. A split skin was employed for the next procedure and gave such a good result that it was repeated in the operation on the first and second fingers. Function is still partly limited, due to joint changes.

fundamentally there is tissue loss and that nothing short of complete replacement will give normal function.

In the presence of healed but adherent scars or contractions, we have our choice of several procedures. These will be considered in turn.

### WHOLE THICKNESS GRAFTS

These should be employed upon a good firm base, such as the palm of the hand, fingers, the forehead, nose, sole of the foot, etc. They should be done only upon a healed, sterile surface, following complete excision of the scar and its base. One should always be prepared to fill in a defect much larger than at first appears to exist. Merely cutting a band of scar and then forcing the joint or tissues back in their normal position will present a truly astonishing need for skin to restore normal function. Application elsewhere, unless firm pressure and immobilization can be applied, is hazardous, and I do not believe that the risk of failure warrants their use, except in carefully selected cases or where other methods are not indicated or possible.

One exception to the above indications for their use is in eyelid surgery. Here Wheeler of New York has brilliantly pioneered the way by successfully applying whole thickness grafts obtained from the opposite lid.

Recently, Padgett [6] of Kansas City and Blair of St. Louis have applied the same to contractures about the neck. It is extremely difficult to maintain constant and equal pressure and immobilization in this area and I would emphasize again that such cases must be carefully selected and the surgeon should be quite guarded in his prognosis.

One often wishes that this plan were open to more universal use since excellent functional and cosmetic results may be obtained; likewise, the time involved (usually three weeks) is much shorter than where flaps or pedicles are employed.

### TUNNEL GRAFTS

Whole thickness skin by tunnel graft [7] method, according to the authors [8] may be used under cicatricial contractions and, if properly placed, will break the continuity of the restraining band and correct the contracture. I have used them on the back of rather badly burned fingers with fair success, but believe in these cases a pedicle flap following syndactylizing the fingers, after the method of Bettman,[9] to be the procedure of choice. They are, however, of great value in chronic leg ulcers or abrasions which, because of poor circulation, fail to heal. I have used them here with great success and, curiously, although they are on a scar tissue base, they thrive and take on a very healthy pink color.

In this treatment of ulcers, one should use care to rule out the possible presence of an existing lues even in the presence of a negative Wassermann, anemia, a high blood sugar with a normal urine, or arteriosclerosis. Dr. N. J. Kilbourne [10] has shown in a recently published paper the care necessary in the diagnosis and the treatment of these troublesome cases. His conclusions strikingly illustrate the small place surgery plays in their treatment.

The lack of size and method of application make this type a temporizing plan, which relieves but never entirely corrects the existing deformity. However, if a cicatricial band is anticipated, a tunnel graft may be early employed to lessen the deformity until more radical treatment is possible.

### SIEVE GRAFTING

Sieve grafting, wherein a large whole thickness graft is obtained, leaving behind islands of attached skin for future regeneration, is of value in that the donor area need not be grafted. There is contracture present, of course, due to the necessary epithelization of the holes made in the graft when the islands are left. This epithelization may be keloidal in type and, if such should be the case, much of the value of this procedure is lost due to the lack of elasticity. The cosmetic result is not always good, but it does permit the application of large full thickness skin grafts in many regions where recourse to a flap or pedicle would have to be otherwise employed. This method has been used on open wounds following excision of granu-

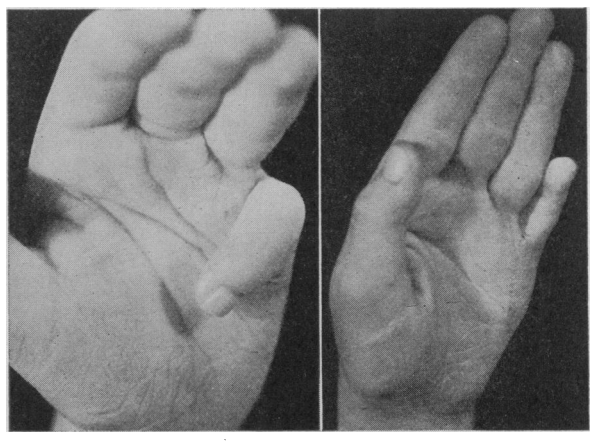

Fig. 4.—A whole thickness graft applied for the correction of a contracted little finger. This case is shown because it clearly demonstrates the lack of growth and development of the little finger during the interval since the injury and its repair, a period of over three years.

lations, but I am dubious about this procedure as a routine treatment.

### FLAPS

It often happens that check-rein or contracting bands of scar situated in the axilla, neck, cubital, or popliteal spaces may be corrected by the Z or reversed Z plan, or even by the simpler V to Y procedure. Staige Davis [11] traces the development of this procedure and illustrates its use in many of these troubling conditions. It is his custom to mark out the pattern with the long arm of the Z on the prominent portion of the band or web with the arms so situated so as to avoid, if possible, the adjacent scar tissue. As will be noted in Figure 1, the original Z was later changed to a reverse Z because it was felt that that plan avoided having scar in the flaps. He wisely points out that the tips of the flaps should be blunt rather than pointed, and this is especially true if scar tissue is contained in the flaps. Secondary incisions with the necessary juggling and adjustment of the flaps may be necessary due to the uncertain pull of the unexcised scar which may often tend to upset the original plan.

We have briefly seen that adherent scars, through a fundamental loss of tissue, tend to cause stiff, immobile, and often permanently damaged joints. It is obvious that this condition may likewise involve all of the underlying structures. In those places where a Thiersch or split skin graft will heal a granulating area or correct a contracture, it will of course be employed. Often, however, because of extensive scarring, lack of subcutaneous tissue, and poor blood supply, the surgeon finds that the above fails in whole or in part. The correction necessary is the addition of not only skin but subcutaneous and fat tissue. Here an early Thiersch graft to heal the area and shorten the convalescence, followed by a flap, sliding, or pedicle graft, will often supply the requisite tissue. This is true since usually such a flap or tube pedicle is constructed to carry skin, subcutaneous tissue, fat, and fascia. If it is only desired, however, to use skin and fat, the flap may be carefully trimmed, using caution to preserve the blood vessels supplying the overlying skin. Likewise, if a tube pedicle is formed and it is apparent that sufficient skin will not be available, then a "frying pan" extension may be added to the distal end of the pedicle to increase the amount of skin transported. Later, when the first "frying pan" is in place, a second may be made at the proximal end of the pedicle.

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### DISCUSSION

George Warren Pierce, M. D., and Gerald Brown O'Connor, M. D., (490 Post Street, San Francisco).—Doctor Kiskadden's interesting paper has given us a comprehensive review of the major factors of the problem of adherent and cicatricial scars. One of the common errors in planning a repair for such scars is the underestimation of the amount of tissue destruction. Excision of apparently small scars often reveals a startling defect and for this reason it is well to have more than one plan in readiness for the reconstruction. Indeed the surgeon must be ready to select any one of the numerous procedures described in this paper, the success of the operation depending on the sufficiency of his judgment.

In regard to skin grafts, we still see patients occasionally where isografts have been tried from various donors. This is a useless and wasteful procedure, as the grafts do not take permanently and some of the patients show a marked secondary anemia from the repeated foreign protein reactions which often accompany such grafts.

Radium or roentgen-ray therapy for adherent scars have not proved satisfactory to us because adherent scars are the result of destruction not only of the skin but also of the fascia and deeper structures. Such scars demand a restitution of parts for restoration of function and contour, and the mere softening of the superficial layers of the scar is not sufficient. Also, unless the therapy is carefully controlled, telangectases and hyperkeratoses result; the latter of which may go on to epitheliomata. For this reason large scars should be replaced by skin flaps, smaller ones perhaps by skin grafts and linear scars treated by simple excision. We do favor the use of radium on all scars of the face ten days after operation as a prophylactic against keloid formation or hypertrophic scar.

In using transposed flaps we find that thinner flaps do better than those bearing too much fat. There is a plexus of blood vessels lying just beneath the skin and if the fat is trimmed very carefully to this layer the blood supply will be preserved.

Treatment of adherent scars is a large subject, and success in treatment is dependent on careful attention to a great number of small details of technique.

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Hugh Jones, M. D. (201 Medical Office Building, Los Angeles).—My interest in the author's paper is from the standpoint of an orthopedic surgeon. Too often orthopedists are confronted with the late extreme deformities that might have been prevented by adequate and proper early care. I wish to emphasize Doctor Kiskadden's points relating to traction and splinting to prevent deformity, and especially the means taken for the early preparation of the surface for grafting. After rather extreme deformities have come about we at times find it necessary to lengthen tendons as well as to relieve skin contractures in order to correct deformities.

Doctor Kiskadden's mention of the full thickness graft for use when subsequent contraction is to be avoided as much as possible, prompts me to tell of an experience with a large full thickness graft which I employed in the popliteal space. A wax model for record was made a few weeks after the grafting operation, and several years later the patient was again seen. At this time another model was made and we were surprised to find that the second model showed that the full thickness skin graft had enlarged about 20 per cent. The graft was crossed by numerous striae atrophica with an appearance very similar to the striae gravidarum. Quite evidently the full thickness graft had been stretched by the retraction of surrounding scar.

The subject-matter brought out in a paper on skin grafting is ever new, because each case requiring plastic relief of a scar deformity is usually a problem in itself and must be so attacked. The subject cannot be dismissed by generalizations.

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WILL L. MILES, M. D. (822 Pacific Mutual Building, Los Angeles).—The author's recommendation of early split skin grafting preparatory to some other type of later repair is, I believe, an excellent one. This type of graft may be employed with all expectancy of a successful take during the early stages of healing when any other type of repair might be either impossible or inadvisable due to the presence of a low-grade infection. Too often we are inclined to postpone all repair until we are certain that an absolutely clean granulating base entirely free from infection is present, only to find that serious contracture has resulted, making the repair more difficult and prolonging convalescence. Thiersch split skin grafts, when properly applied, will survive and give a remarkably high percentage of takes even when planted on a very poor or mildly septic soil. An exception to this is the occasional case of low-grade infection, which is marked by the presence of *Bacillus pyocyaneus*. My experience has been that when this organism is present it is useless to attempt any type of graft as failure will invariably result; the graft melting away completely in a flood of green pus.

## INFECTIONS OF THE GENITO-URINARY TRACT*

*By* MILEY B. WESSON, M. D.
*San Francisco*

DISCUSSION *by Thomas W. Bath, M. D., Reno, Nevada; Burnett Wright, M. D., Los Angeles; Lloyd Kindall, M. D., Oakland.*

PRACTICALLY every member of this society is interested in the treatment of diseases of the genito-urinary tract, and rarely a day passes but what the post brings to him a circular letter extolling the merits of some drug that will "cure" all such infections. It has long been an axiom of therapeutics that any disease with numerous sure cures is frequently impossible to cure, and urologists subscribe whole-heartedly to this dogma.

Genito-urinary lesions manifest themselves from the cradle to the grave. The pediatrician has to deal with pyelitis and bed wetting, and the general practitioner is annoyed with the "strains" of wild youths and the "honeymoon appendicitis" of the female adolescent, to say nothing of the women who have "colds in the bladder" or "weak kidneys." And, of course, we are all familiar with the old man who has spent the first part of his life making money and the latter part trying to make water. The world's greatest surgeons, including Sir John Hunter and Dr. William S. Halsted, have been intensely interested in this field, and it is for this reason that it has reached its present stage of scientific precision.

### DIFFICULTIES MET WITH IN PRACTICE

With the advances in the refinements of bacteriology and laboratory technique, we poor practitioners of medicine are enmeshed in a mass of exceptions to the generally accepted rules. Theoretically, urine smears and cultures should always agree, but in a study of three thousand routine cultures from the urological clinic at Johns Hopkins Hospital, it was found that smears and cultures agreed in only 64 per cent of the cases. Gram-negative bacilli of the proteus and colon group with staphylococci present no difficulties to the bacteriologist. When in such numbers as to show in smears, they are easily cultivated in carbohydrate broth and agar; streptococci need an enriching medium of blood and serum agar and must be transferred to such when seen in smears. As was expected, many organisms were found in the cultures that did not show in the smears, due to their scarcity; however, in practically 6 per cent of the cases organisms were seen in the smears and the cultures were negative.

A number of explanations are possible: (1) The organisms were dead from the action of antiseptics; (2) artefacts and not organisms were seen; (3) organisms seen in epithelial cells are usually nonviable; (4) a special medium was needed; or (5) the cultures were not properly protected from light, cold, and air. A Gram-negative, nonsporulating bacillus was found that was so sensitive in its oxygen requirements that it was killed by exposure to the air in from forty to one hour and fifteen minutes.

In a series of 600 bladder infections they found that 351 were infected with colon-group organisms, and of these 253 were found in pure culture. The staphylococci were found in 265 cases and 122 were in pure cultures, while there were 67 cases of streptococci, 30 of which were obtained in pure cultures. A parallel study of kidney infections showed a lower incidence of colon bacilli, but a much greater increase in staphylococci and proteus, B. pyocyaneus and organisms of the paratyphoid group. In 203 patients with blood stream infections, there were 104 cases of the colon group, 27 staphylococcus, 18 proteus, etc. The mortality for the proteus group was 55 per cent. This is rather surprising to those of us who were taught in the bacteriology laboratory to look with contempt upon this organism.

The difficulty of completely eradicating infections of the genito-urinary tract is due to the fact that the bacteria have usually penetrated so deeply that local treatment, whether of the urethra, bladder or the kidney pelvis, usually fails to reach the depths of the infection. In the use of antiseptics we must always remember to keep the dilution as low as possible so as to do no tissue damage. Oral medication, as a whole, has been a failure. Intravenous chemotherapy, protein and

* Read at the twenty-ninth annual meeting of the Nevada State Medical Association, Reno, Nevada, September 23-24, 1932.